

What's changed in the world of reliability with the update to API17N

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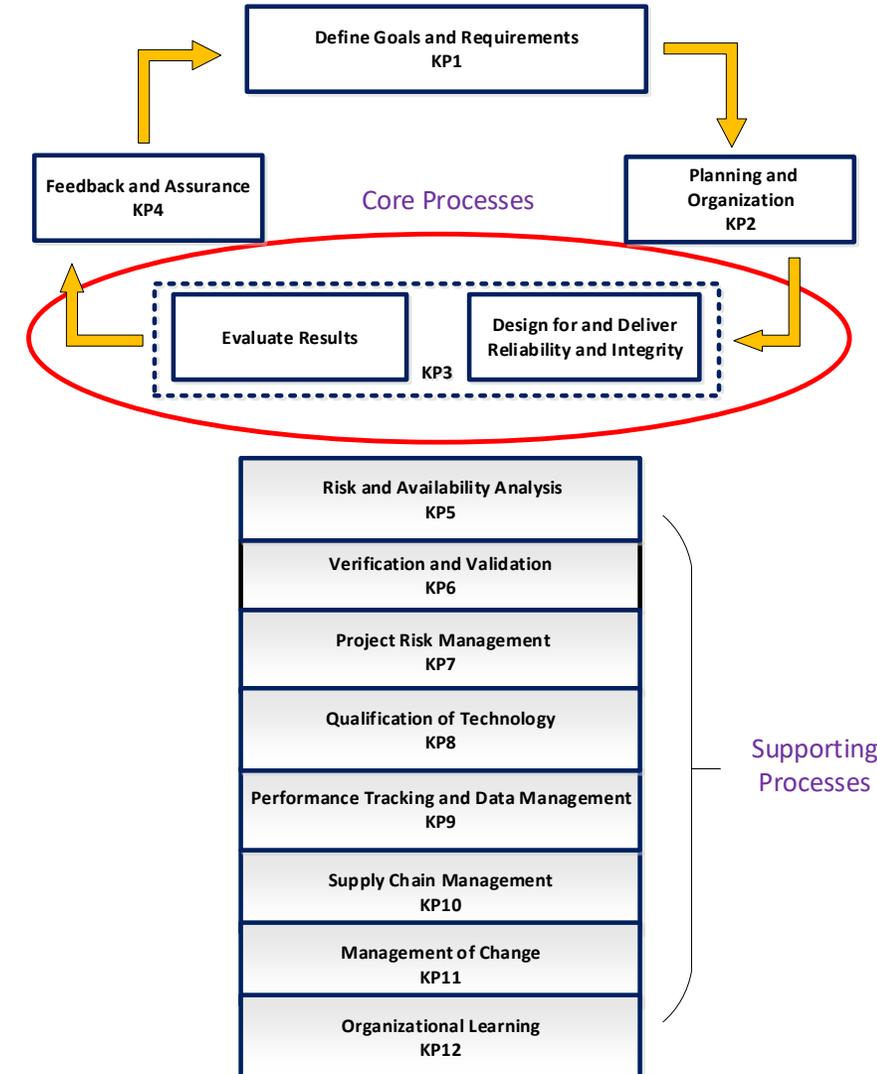
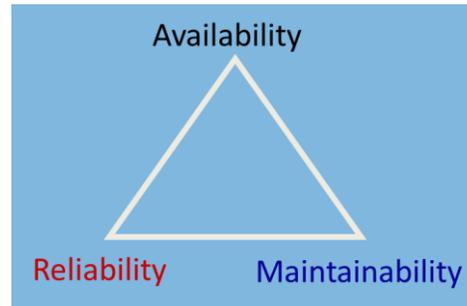
MCEDD
DEEPWATER DEVELOPMENT

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The History of API 17N

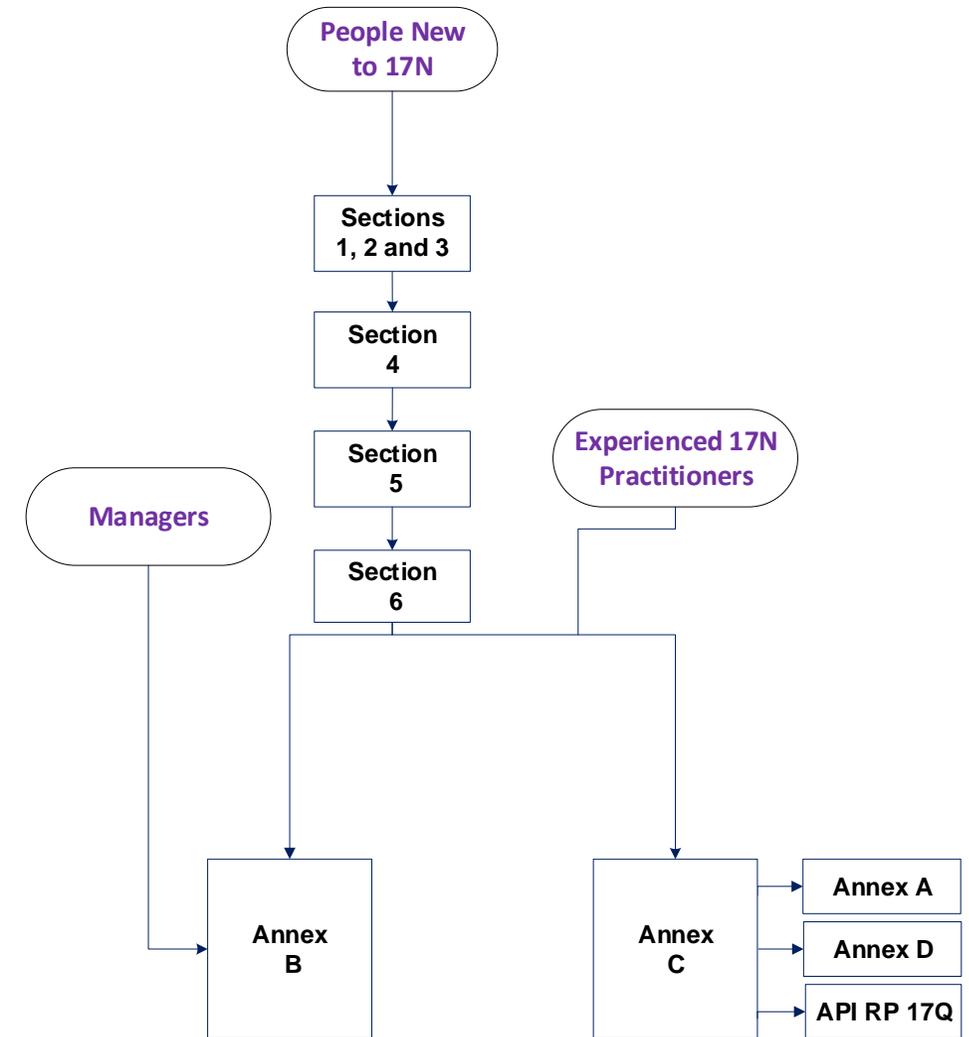
- Drivers & foundations to development of 17N,
 - Poor subsea reliability seen in ‘CRINE’ era subsea developments
 - Recognition that the unique challenges of subsea environment required a dedicated standard
 - Existing standards such as ISO 20815 *, DNV-RP-A203 **
- First edition (2009)
 - Core goal to, *achieve high availability through improved reliability*
 - Clear focus on design
 - Based around 12 key processes
- Second edition (2017)
 - The 12 core KPs kept but updated around industry learning and feedback
 - The importance of integrity as an element of reliability
 - The \$55 dollar barrel oil world



* ISO 20815 Petroleum, petrochemical and natural gas industries, Production assurance and reliability management
 ** DNV-RP-A203 3Technology Qualification

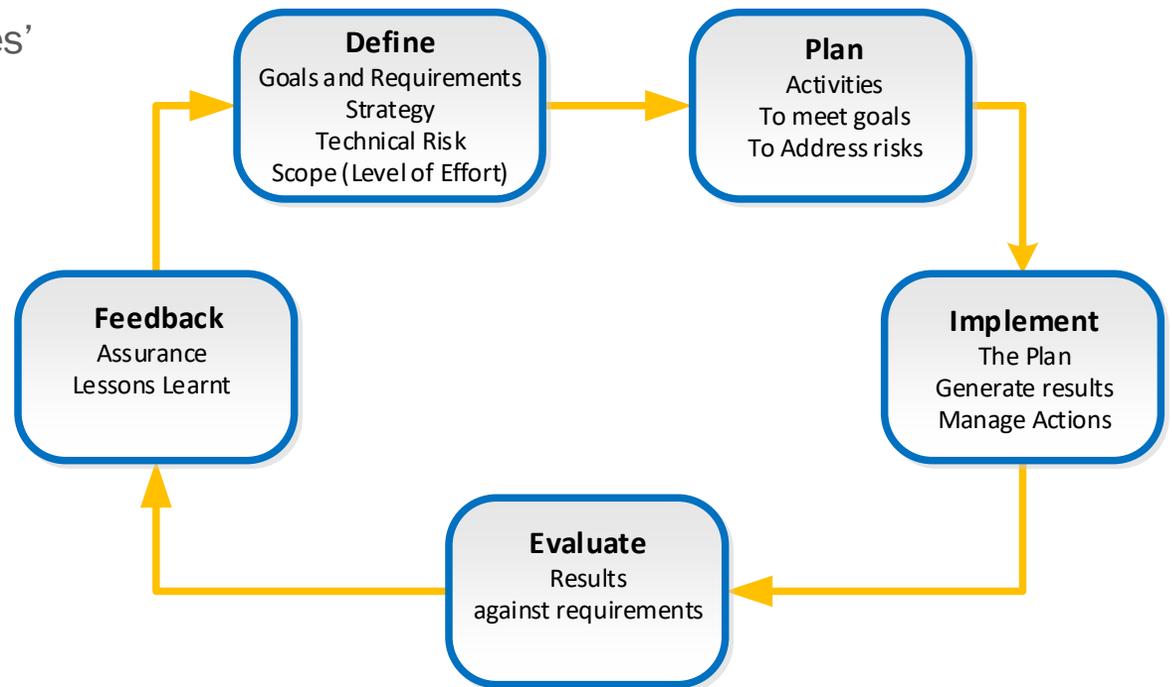
Structural / Editorial Changes

- Significantly revised document structure
 - For non-reliability specialists updated structure will make API easier to use and apply
 - Minimum expectations for suppliers in respect to reliability and integrity activities
- Guidance on qualification activities separated out
 - Qualification guidance enhanced and is being moved to API17Q
- Better recognition that reliability activities must add value
 - Clear focus on the need to ensure RIM effort at each activity stage is consistent with the identified level of risk



Technical Changes

- Greatly expanded detail on risk and Integrity
 - Design for and deliver reliability and integrity (DfRI) model, introduced as update to KP3
 - Evaluate step now presented as *'explicit'* rather *'implicit'*
- New processes
 - Technical Risk Assurance Review (TRAR)
 - Additional Technical Risk Categorisation (TRC) for 'procedures'
- Scope, widened to more effectively cover the whole project lifecycle
 - Operations
 - Field extensions
 - Obsolescence
 - Decommissioning



Example, Technical Risk Assurance Review (TRAR) Process

- The purpose of the TRAR is to identify problems and gaps in a suppliers existing reliability / integrity / technical risk management programs
 - Developed from existing bespoke Operator processes, for instance TRAP* in BP
- The TRAR process challenges the design in the following areas

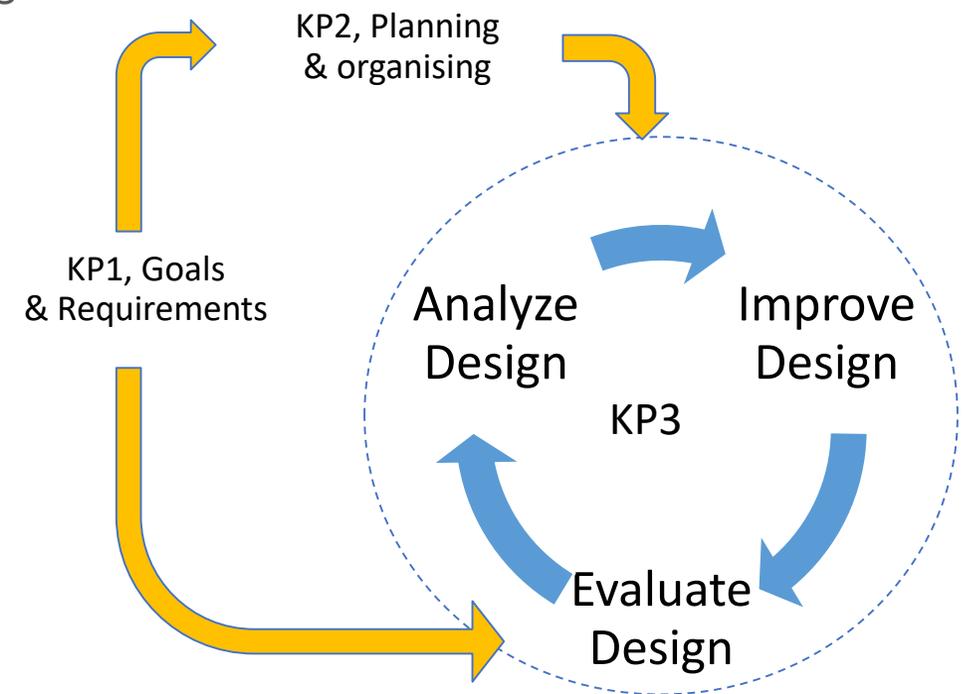
- design
- function
- seals - containment
- reliability and integrity goals and requirements
- failure analysis activities
- materials and compatibility,
- loads and stress
- environments
- Technology Readiness Level (TRL)
- supply chain risks

Developed from failure 'root causes' commonly seen in subsea developments

- The intent is that the TRAR process is 'formal, systematic, auditable and Transparent'

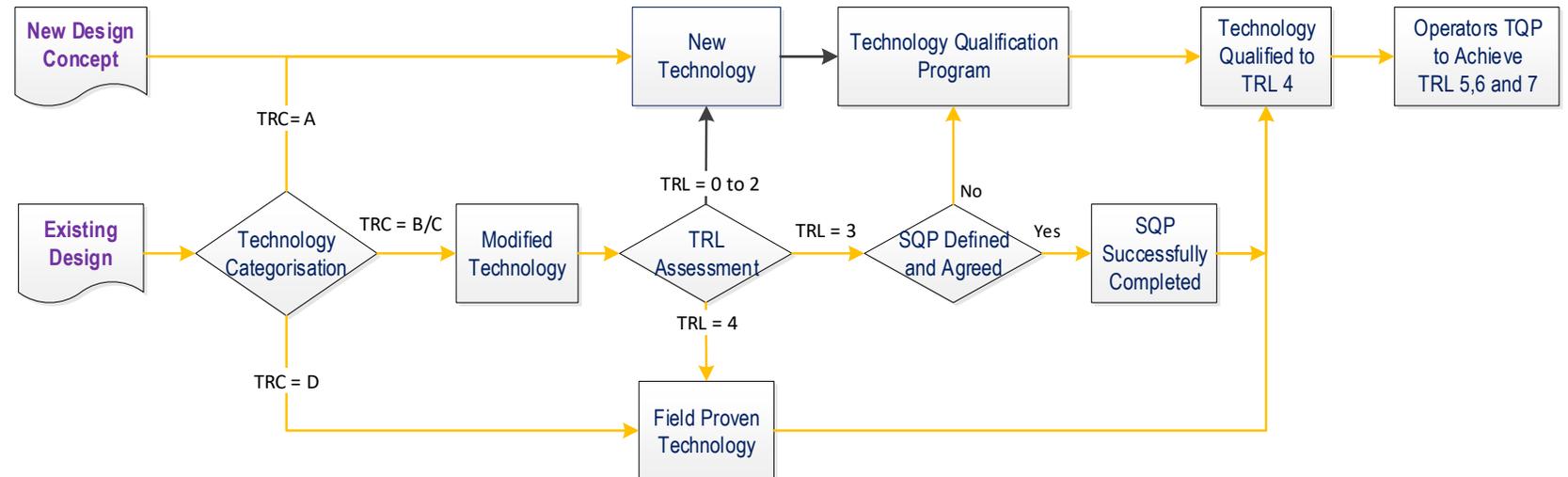
Example, Design For and Deliver Reliability and Integrity (DfRI) KP3

- Developed from the previous KP3 ‘Design for Manufacture and Availability’
 - First edition provided limited detail and no real clarity on the split between operator and OEM responsibilities
- KP3 now focussed on the need to deliver reliability and integrity across all the project phases, including Operations
 - Based around an Analyse / Evaluate / Improve Loop, driven by KP 2 & 3
 - Clarity on Operator / OEM Expectations
 - Specific areas to focus on during design based on industry experience
 - Existing guidance manufacture for availability now incorporated in other standards eg 17F (controls) for HASS and HALT



Qualification API 17 Q

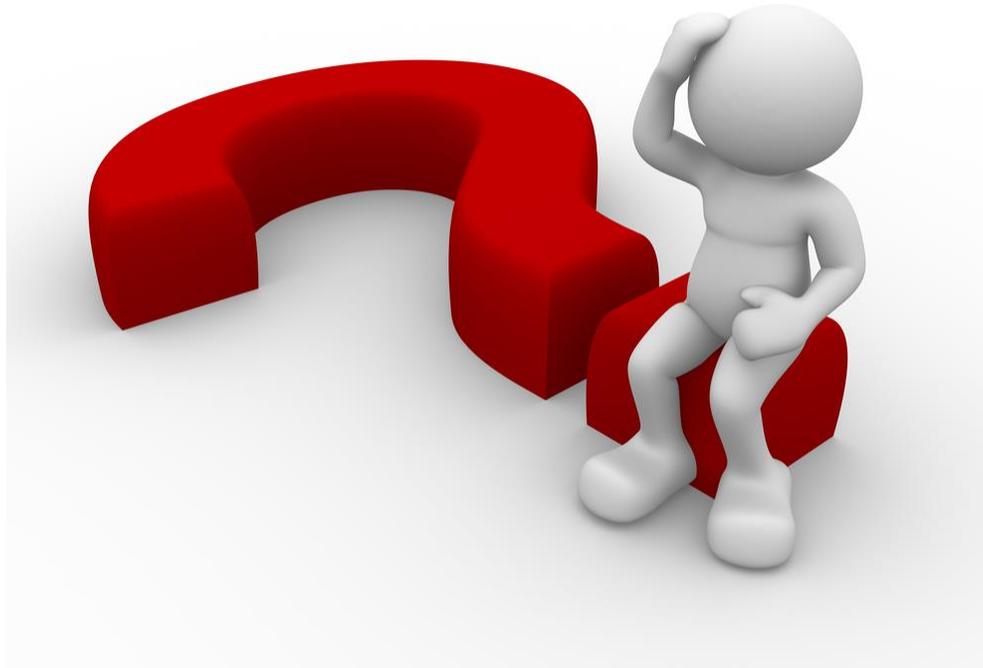
- 1st edition of 17Q provided a ‘structured framework for subsea equipment qualification’
 - Limited industry take-up, Operator focussed
- Second edition, brings together subsea qualification process into a single API document, focussed across industry rather than just Operator
 - Existing qualification material moved from 17N to 17Q
 - Detailed guidance on qualification activities now included as a 10 step process
 - Different processes for ‘standard’ and ‘technology’ qualification programmes introduced
 - Source API for TRL definitions
 - Q-FMECA introduced as a specific tool
 - PQS# datasheet element dropped



Summary, What to Look for in the 2nd Edition

- Stronger emphasis on ensuring reliability activities are value adding, *key in today's market*
- Easier to use, *more logical document structure*
- More help on risk and integrity, *particularly relevant to organisations new to the industry*
- Focussed risk based approach to qualification, *differentiation between low and high risk qualification activities*
- Additional guidance on applying standards to Operations and late life, *Decommissioning now included as a specific project phase*
- TRAR, *implemented as TRAP by BP, a core element of our reliability assurance processes since 2004*
- New TRC guidance aimed specifically at categorising 'procedural risk', *for instance with installation and commissioning activities*

Questions



References and Acknowledgements



- John Strutt (Chief Consultant and Technical Director, Astrimar)
- Elizabeth Garry (Chief Consultant and Director of Astrimar)
 - Astrimar is an independent specialist engineering consultancy delivering excellence in Reliability, Integrity Assurance and Technical Risk Management.
 - <http://www.astrimar.com>